

CLAIMS

What is claimed is:

- 1 1. A method of determining a multilayer switching path for a flow between a source
2 device and a destination device in a switched network, the method comprising the
3 computer-implemented steps of:
4 determining a Layer 3 path and a Layer 2 path through the network from the
5 source device to the destination device;
6 selecting each route processor of the network that is in the Layer 3 path and that
7 appears on a Layer 2 path that is associated with the source device and the
8 destination device and that leads to and emanates from the route processor;
9 selecting, for each selected route processor, a switch in the network that satisfies a
10 pre-determined set of criteria as a relevant switch engine that multilayer
11 switches the selected route processor;
12 creating and storing information that defines a multilayer switching path and that
13 includes information identifying the source device, destination device, and
14 each selected switch.
- 1 2. A method as recited in Claim 1, wherein selecting the switch that satisfies the pre-
2 determined set of criteria comprises identifying one or more switches in the
3 network that are configured as switch engines, associated with the selected route
4 processor, and included in Layer 2 paths leading to and emanating from the
5 selected route processor.

1 3. A method as recited in Claim 2, wherein selecting the switch that satisfies the pre-
2 determined set of criteria as the relevant switch engine further comprises selecting
3 from the set of switches as the relevant switch engine the switch that contains an
4 MLS-entry that matches the flow between the source device and the destination
5 device when there is only one switch that contains the MLS-entry that matches the
6 flow.

1 4. A method as recited in Claim 3, wherein selecting the switch that satisfies the pre-
2 determined set of criteria as the relevant switch engine further comprises selecting
3 from the set of switches as the relevant switch engine the switch that contains an
4 MLS-entry that matches the flow between the source device and the destination
5 device and that is the farthest away on the Layer 2 path from the selected route
6 processor when there is more than one switch that contains the MLS-entry that
7 matches the flow.

1 5. A method as recited in Claim 2, further comprising establishing a flow between
2 the source device and the destination device when no flow exists between the
3 source device and destination device during determination of the multilayer
4 switching path.

1 6. A method as recited in Claim 5, wherein establishing the flow between the source
2 device and the destination device further comprises sending packets from the
3 source device to the destination device when the source device is not remote.

1 7. A method as recited in Claim 5, wherein establishing the flow between the source
2 device and the destination device further comprises sending packets from a
3 network management station when the source device is remote, and such that
4 packets that are sent from the network management station traverse the relevant
5 switch engine for the selected route processor.

- 1 8. A method as recited in Claim 5, wherein establishing the flow between the source
2 device and the destination device further comprises sending packets from any
3 route processor that is upstream from the selected route processor to the
4 destination device when the source device is remote.
- 1 9. A method as recited in Claim 5, wherein establishing the flow between the source
2 device and the destination device further comprises sending packets from any
3 route processor that is upstream from the selected route processor to the
4 destination device when the source device is remote and when the packets that are
5 sent from a network management station do not traverse the relevant switch
6 engine for the selected route processor.
- 1 10. A computer-readable medium comprising one or more sequences of instructions
2 for determining a multilayer switching path for a flow between a source device
3 and a destination device in a switched network, which instructions, when executed
4 by one or more processors, cause the one or more processors to carry out the steps
5 of:
6 determining a Layer 3 path and a Layer 2 path through the network from the
7 source device to the destination device;
8 selecting each route processor of the network that is in the Layer 3 path and that
9 appears on a Layer 2 path that is associated with the source device and the
10 destination device and that leads to and emanates from the route processor;
11 selecting, for each selected route processor, a switch in the network that satisfies a
12 pre-determined set of criteria as a relevant switch engine that multilayer
13 switches the selected route processor;
14 creating and storing information that defines a multilayer switching path and that
15 includes information identifying the source device, destination device, and
16 each selected switch.

1 11. A computer-readable medium as recited in Claim 10, wherein selecting the switch
2 that satisfies the pre-determined set of criteria comprises identifying one or more
3 switches in the network that are configured as switch engines, associated with the
4 selected route processor, and included in Layer 2 paths leading to and emanating
5 from the selected route processor.

1 12. A computer-readable medium as recited in Claim 11, wherein selecting the switch
2 that satisfies the pre-determined set of criteria as the relevant switch engine further
3 comprises selecting from the set of switches as the relevant switch engine the
4 switch that contains an MLS-entry that matches the flow between the source
5 device and the destination device when there is only one switch that contains the
6 MLS-entry that matches the flow.

1 13. A computer-readable medium as recited in Claim 12, wherein selecting the switch
2 that satisfies the pre-determined set of criteria as the relevant switch engine further
3 comprises selecting from the set of switches as the relevant switch engine the
4 switch that contains an MLS-entry that matches the flow between the source
5 device and the destination device and that is the farthest away on the Layer 2 path
6 from the selected route processor when there is more than one switch that contains
7 the MLS-entry that matches the flow.

1 14. A computer-readable medium as recited in Claim 11, further comprising
2 establishing a flow between the source device and the destination device when no
3 flow exists between the source device and destination device during determination
4 of the multilayer switching path.

1 15. A computer-readable medium as recited in Claim 14, wherein establishing the
2 flow between the source device and the destination device further comprises
3 sending packets from the source device to the destination device when the source
4 device is not remote.

1 16. A computer-readable medium as recited in Claim 14, wherein establishing the
2 flow between the source device and the destination device further comprises
3 sending packets from a network management station when the source device is
4 remote, and such that packets that are sent from the network management station
5 traverse the relevant switch engine for the selected route processor.

1 17. A computer-readable medium as recited in Claim 14, wherein establishing the
2 flow between the source device and the destination device further comprises
3 sending packets from any route processor that is upstream from the selected route
4 processor to the destination device when the source device is remote.

1 18. A computer-readable medium as recited in Claim 14, wherein establishing the
2 flow between the source device and the destination device further comprises
3 sending packets from any route processor that is upstream from the selected route
4 processor to the destination device when the source device is remote and when the
5 packets that are sent from a network management station do not traverse the
6 relevant switch engine for the selected route processor.

1 19. An apparatus for determining a multilayer switching path for a flow between a
2 source device and a destination device in a switched network, the apparatus
3 comprising:
4 means for determining a Layer 3 path and a Layer 2 path through the network from
5 the source device to the destination device;

6 means for selecting each route processor of the network that is in the Layer 3 path
7 and that appears on a Layer 2 path that is associated with the source device
8 and the destination device and that leads to and emanates from the route
9 processor;
10 means for selecting, for each selected route processor, a switch in the network that
11 satisfies a pre-determined set of criteria as a relevant switch engine that
12 multilayer switches the selected route processor;
13 means for creating and storing information that defines a multilayer switching path
14 and that includes information identifying the source device, destination
15 device, and each selected switch.

1 20. An apparatus for determining a multilayer switching path for a flow between a
2 source device and a destination device in a switched network, the apparatus
3 comprising:
4 a network interface that receives one or more messages from the network;
5 one or more processors coupled to the network interface to receive the messages
6 therefrom;
7 a memory accessible to the one or more processors; and
8 one or more sequences of instructions stored in the memory which, when executed
9 by the one or more processors, cause the one or more processors to carry
10 out the steps of:
11 determining a Layer 3 path and a Layer 2 path through the network from
12 the source device to the destination device;
13 selecting each route processor of the network that is in the Layer 3 path
14 and that appears on a Layer 2 path that is associated with the source
15 device and the destination device and that leads to and emanates
16 from the route processor;
17 selecting, for each selected route processor, a switch in the network that
18 satisfies a pre-determined set of criteria as a relevant switch engine
19 that multilayer switches the selected route processor;

20 creating and storing information that defines a multilayer switching path
21 and that includes information identifying the source device,
22 destination device, and each selected switch.